Application Part A

Project Description, Organizational, Financial, and Legal Information

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A-7 Monitoring and Evaluation
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A-1 Urban Water Conservation Grant Application Cover Sheet

1. Applicant (Organization or affiliation): **Inland Empire Utilities Agency**
2. Project Title: **Water Conservation Program for the California Institution for Men and Associated Facilities located in the City of Chino**
3. Person authorized to sign and submit proposal:

Name, Title	**Richard W. Atwater, CEO/General Manager**
Mailing address	**P.O. Box 697, Rancho Cucamonga, CA 91729**
Telephone	**909-993-1740**
Fax	**909-357-3870**
E-mail	**atwater@ieua.org**

4. Contact person (if different):

Name, Title	**David Hill, Manager of Water Resources**
Mailing address	**P.O. Box 697, Rancho Cucamonga, CA 91729**
Telephone	**(909) 993-1705**
Fax	**(909) 357-3870**
E-mail	**dhill@ieua.org**

5. Funds requested (dollar amount): **$2,340,000**
6. Applicant funds pledged (local cost share) (dollar amount): $0
7. Total project costs (dollar amount): **$2,340,000**
8. Estimated net water savings (acre-feet/year): **1,118.23**
   Estimated total amount of water to be saved (acre-feet): **16,773.45**
   Over 15 years
   Benefit/cost ratio of project for applicant:
   Estimated $/acre-feet of water to be saved **$467/acre-feet**
9. Project life (month/year to month/year): July 2004 – July 2019
10. State Assembly District where the project is to be conducted: 61st
11. State Senate District where the project is to be conducted: 32nd
12. Congressional District(s) where the project is to be conducted: 41st
13. County where the project is to be conducted: San Bernardino
14. Do the actions in this application involve physical changes in land use, or potential future changes in land use? No

A-2 Application Signature Page

By signing below, the official declares the following:

The truthfulness of all representations in the application;

The individual signing the form is authorized to submit the application on behalf of the applicant;

The individual signing the form read and understood the conflict of interest and confidentiality section and waives any and all rights to privacy and confidentiality of the application on behalf of the applicant; and

The applicant will comply with all terms and conditions identified in this Application Package if selected for funding.

_____	Richard W. Atwater, CEO/General Manager	_____
Signature	Name and Title	Date

A-3 Application Checklist

Complete this checklist to confirm all sections of this application package have been completed.

Part A: Project Description, Organizational, Financial and Legal Information
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___X___A-6 Statement of work, schedule
___X___A-7 Monitoring and evaluation
___X___A-8 Qualification of applicant and cooperators
___X___A-9 Innovation
___X___A-10 Agency authority
__n/a __A-11 Operation and maintenance (O&M)
Part B: Engineering and Hydrologic Feasibility (construction projects only)
__n/a__B-1 Certification statement
__n/a__B-2 Project reports and previous studies
__n/a__B-3 Preliminary project plans and specifications
__n/a__B-4 Construction inspection plan
Part C: Plan for Environmental Documentation and Permitting
__n/a__C-1 CEQA/NEPA
__n/a__C-2 Permits, easements, licenses, acquisitions, and certifications
__n/a__C-3 Local land use plans
__n/a__C-4 Applicable legal requirements
Part D: Need for Project and Community Involvement
__X____D-1 Need for project
__X____D-2 Outreach, community involvement, support, opposition
Part E: Water Use Efficiency Improvements and Other Benefits
__X____E-1 Water use efficiency improvements
__X____E-2 Other project benefits
Part F: Economic Justification, Benefits to Costs Analysis
__X____F-1 Net water savings
__X____F-2 Project budget and budget justification
__X____F-3 Economic efficiency
Appendix: Benefit/Cost Analysis Tables
__X____Tables 1; 2; 3; 4a, 4b, 4c, 4d; and 5

A-4 Description of Project

The Inland Empire Utilities Agency is proposing to implement a water conservation program for three facilities located in the City of Chino. The three facilities are called the California Institution for Men (CIM), the California Institution for Women (CIW), and the Hernan G. Stark, Youth Training School (YTS). For the purposes of this proposal, the three facilities will collectively be referred to as CIM. In some cases, the individual facility will need to be named to identify specific conservation retrofit opportunities. The CIM is located in the County of San Bernardino. Situated on approximately 2,700 acres of State owned land in Chino, Ca., there are two prisons, a youth authority, and several other State operated facilities. The scope of this project addresses the water use at the prisons and youth authority only, as little savings opportunities exist at the other sites. There are 9,100 inmates, as well as 2,000 staff, that are on site at the affected facilities on a daily basis. The purpose of the proposed program is to retrofit all designated plumbing flush and shower valves to reduce water usage to conserve water. The proposed program also increases the overall safety to staff as well as inmates through the use of an automated system, which eliminates the misuse of plumbing fixtures in cells. Lastly, we will automate the manual irrigation valves and implement weather-based irrigation schedules to reduce over-watering on the many acres of irrigated turf.

There are four key goals associated with this project. They are to reduce water usage, decrease sewer expenses, minimize maintenance problems, and improve security issues.

The following objectives will help us achieve our goal to reduce water usage:

- Eliminate excessive flushing by replacing the existing system with the ICON flush valve system that can monitor valve usage, restricting the number of flushes;
- Replace the existing water closets to reduce the number of gallons of water used per flush from the present average 4.5 to approximately 1.3 gallons;
- Retrofit existing shower valves with a timer format to control shower time to eliminate excessive and wasteful showering;
- Replace higher gallon showerheads with low flow showerheads to reduce the amount of water used during showers;
- Automate the manual irrigation valves so that watering of the irrigated turf is timed; and
- Implement a weather-based irrigation schedule to reduce over-watering on the many acres of irrigated turf.

To decrease the sewer expenses associated with abuse of plumbing fixtures the proposed program will:

- Replace the existing fixtures flush and shower valves that are often used to clog plumbing with pressure sensitive buttons with no moving parts thus making the system nearly vandal-proof; and
- Enable staff to ‘lock out’ excessive flushing almost eliminating the maintenance hours associated with clogged pipes and flooded cells.

In addition to the aforementioned objectives, maintenance problems will be further minimized because this program provides formal training to educate maintenance staff as to operation, replacement techniques, and troubleshooting. Security issues at the

facility will be improved because inmates will not have to be removed from cells so that staff can work on flooding issues.

The methods and procedures used to achieve our goals and objectives are described in the attached Statement of Work.

The expected outcomes associated with this program are anticipated to be similar to those of programs implemented at other institutions. Examples include a reduction of approximately 166 gallons of water per day per toilet, 3.2 gallons of water saved per flush per toilet, a minimum of 50% reduction in the number of flushes, and between 30% to 50% reduction of water used for irrigation.

Water conservation techniques implemented will reduce water consumption by 1,118.23 acre-feet and save the institutions $522,213 annually. The benefits resulting from implementation of this program will result in a payback of the amount of funding ($2,340,000) in 4.5 years. A review of the costs and savings resulting from this program along with benefits, like security and maintenance, make this program a top priority for the CIM.

A-5 Maps

Attached is a map of the Inland Empire Utilities Agency service area and identification of the project sites.

A-6 Statement of Work, Schedule

FLUSH VALVE AND SHOWER RETROFITS:

1. LOCATION OF RETROFITS - SYSTEMS AFFECTED: All toilets and showers in facilities.
   In each plumbing chase, except for some brand differences of plumbing parts, each plumbing format is standard for the facility. Each cell has a set of toilet (water closet) and lavatory stainless steel fixture(s) in plumbing area (in either a combination format where the fixture has flush and lavatory together, or where there are two separate fixtures - flush and lavatory). On the other side of the wall from where the stainless steel fixture(s) are located in the cell or housing areas, the plumbing valves are located in a plumbing chase. All maintenance work, and plumbing valve retrofits, is performed in the chase for the existing plumbing valves.

   Each cell or housing area water closet flush valve will be affected by the retrofit. The water closet flush valve is a "standard" flush valve, and includes valves manufactured by Sloan. Each flush valve has an activation button for the inmate to "press" when they wish to flush the toilet, which is connected through the chase wall and mounted on the stainless steel fixture in the cell or housing area.

   In each of the chases, these existing water closet valves and activation buttons will be removed, and the valves retrofitted, as part of the program.

2. DESCRIPTION OF RETROFIT COMPONENTS: Direct replacement of flush valves, and activation buttons are part of the retrofit. Additionally, ICON electronics package will be mounted in each chase. Low voltage power will be supplied, as part of the overall program, to each chase to power the systems.

   A. Replacement of Existing Flush valve with ICON Flush Valve: ICON flush valve, model P/N FV17001 will be installed in the same location as the existing Sloan valve. The ICON valve is similar to, and operates like, an irrigation valve. It is non-metallic valve made of Zytel plastic, for extended durability and anti-corrosion properties, and has a 24 VAC solenoid, which opens and closes the valve assembly. The valves have modular type connectors attached to the solenoid for connection to ICON electronics package. The flush valve has an external, adjustable volume control located on the valve that allows flow from full to no flow for maintenance or other issues. The valve also includes a manual override feature to enable staff to flush toilet by bypassing electronic control in the event of power loss or for troubleshooting.

   The ICON flush valve has a "straight through" flow and the flush time is not controlled by a conventional flushometer diaphragm. This flushing mechanism of the valve allows the use of a 1.3-gallon valve to effectively flush waste for existing 4.0 to 5.0 gallon fixtures.

   The ICON valve is installed at the same location as the existing flush valves. The only modification to the existing piping, once the existing flush valve is removed,

is to shorten the vacuum breaker pipe. The ICON valve is slightly longer than a conventional flush valve, and so approximately .5 inches of the adjoining pipe will be removed so the ICON valve can fit properly in line with the existing piping.

Product specifications: 24 VAC, 60 Hz. Connection: 1 inch FIPT (inlet) 1.5 inch MIPT (outlet). Construction: High Impact, non-corrosive Dupont Zytel plastic. Max. Operating pressure: 150 PSI Minimum operating pressure" 15 PSI Vacuum breaker: 1.5 inch gauge brass. Flush tubing 1.5 inch, 17-gauge brass.

B. Replacement of existing shower valves with Icon shower valves. Icon retrofit shower adaptors will retrofit to all types of existing shower valves so that the showers can be controlled with a timer format, eliminating excessive and wasteful showering. The shower valves have modular plugs so that they can be connected to the Icon electronics package. In addition, the valves have a manual override as well.

Product specifications: 24 VAC, 60 HZ. Max. Operating Pressure: 125 PSI. In. Operating Pressure: 15 PSI. Max. Fluid Temperature: 140 degrees.
Construction: Dupont Zytel plastic.

C. Replacement of activation buttons of flush and shower valves: The existing flush activation button and shower activation buttons will be removed and replaced with ICON activation buttons. ICON activation buttons are stainless steel and are pressure sensitive activated. The buttons have no mechanical moving parts, are completely waterproof, and nearly vandal-proof. The sensor buttons operate on a "strain gauge" principle and the sensor adjustment is self-calibrating. Icon buttons are ADA approved (American Disabilities Act). Each button includes 6 feet of wire with modular plug for connection to ICON electronics package.

Product specifications: 5 VDC. Sealing. Waterproof. Stainless steel

D. ICON Electronics Package: In each plumbing chase, one ICON electronics package will be installed. The package will be attached to the wall within 3-5 feet of the plumbing valves. Model number CNC-107 format will be provided, to interface with existing valves. This electronics package will control and interface with up to four sets of flush valves and activation buttons.

E. ETL Showerheads: In each shower area, where appropriate, low flow correctional showerheads will replace higher gallon showerheads to achieve additional water savings.

SUPPORT SERVICES: Complete installation, training and education on the use of the ICON systems are provided with the hardware previously described. Formal training classes are provided as part of the project for maintenance staff as to operation, replacement techniques, troubleshooting, etc. It is the factory position that overall maintenance on plumbing systems will be greatly reduced, but that some on-going maintenance will be necessary as is expected over time. Products include a standard two-year warranty. A small parts inventory for repair or replacement will be provided.

WORK SCHEDULE:

In general, each chase retrofit will require the same length of actual retrofit hours. Estimates of additional hours, due to security operations have been estimated based on numerous past installations.

IRRIGATION RETROFIT & PROGRAMS:

Currently, most irrigated grounds within the CIM facilities are irrigated with treated (expensive) water and the system (which dates back to the 1940's) is also manually operated by prison staff and inmates. The irrigation valve is "turned on" by hand at certain times of the day/week/year, and irrigates for as long as that valve is left on. In general, this type of irrigation practice will waste a large amount of water, as valves are left on for long periods of time. The program recommended in these areas will be to automate the irrigation practices, so that water waste will be greatly reduced. By installing irrigation controllers, the watering of the grounds will be preset based on weather and irrigation expertise. Rainbird irrigation controllers and related equipment will be provided so that reliability and future parts issues will be secure.

Included in the program will be a scientifically based watering schedule for the grounds based on plant materials, soil types and local weather patterns. Basically, a monthly watering schedule will be provided to staff so that each month a "smart" program is scheduled into each time clock. Watering using weather-based scheduling and expertise will generally reduce water consumption from 30% to 50%.

There are also many areas that have automated irrigation systems, but scheduling is done without use of weather-based information, irrigation efficiency or other critical information for proper watering schedules. The result is over-watering of the automated irrigation areas. The watering schedule approach will be implemented in these areas as well to improve watering schedules.

INSTALLATION OF AUTOMATED IRRIGATION SYSTEMS: The CIM has the majority of the manual systems operating. Each manual valve will be replaced with an electrically operated irrigation valve. Rainbird time clocks will be installed at designated locations to interface with the new automatic valves. Low voltage irrigation wires will be run from the clocks to each valve. Institution labor will be utilized in this effort for trenching of lines.

There will be approximately 252 new irrigation valves and 11 controllers installed, along with necessary wiring, sleeving, electrical work, testing, etc. to complete the work per all state and local codes. United Greentech will perform all contracting work per appropriate licensing.

After installation of the hardware described to automate irrigated areas on the CIM grounds, the GreenLeaf Water Management Program will be implemented. The Greenleaf water management system is an internet based water management tool that combines historical ETO levels and soil and plants conditions to calculate exact run times for each valve to minimize water usage and eliminate runoff. This schedule will provide a more scientifically based approach to irrigating, which historically has reduced water consumption by as much as 50% when using automated irrigation. Each time clock and valve area will be mapped and provided to on-site staff. All clocks and valves will also have a yearly watering schedule based on sprinkler efficiency, plant materials, soil types, local weather patterns, etc. Greenleaf will provide on-going support and communication with site staff to assure use and understanding of Greenleaf programs.

In addition, there are many areas that are watered with above ground watering devices. Again, the GreenLeaf program will be offered to institution staff so that a

"smarter" watering schedule is used when these devices are utilized.

At the CIW, most systems are already automated, and so the GreenLeaf Program will be utilized here as well, where better schedules will be provided to grounds staff for all irrigated areas, with support and follow-up as well.

Lastly, GreenLeaf, with many years of horticultural experience and approaches for better water usage and plant health, will provide consulting to site staff so that overall watering practices, pesticide use, etc. is performed. These practices will not only add additional water savings, but will reduce overall facility grounds costs, while improving site appearance and plant health.

WORK SCHEDULE – ALL PROGRAMS: Work can begin 30 days from the date of the Notice to Proceed.

RELATED ITEMS AS PART OF PROGRAM:

- Security procedures: During survey stage, security procedures per prison staff will be incorporated into work schedule. All contractor employees will be instructed in procedures as well.
- Licenses/Insurance/Permits/Fees: Will all be in place prior to the start of the survey phase. Staff will be asked to provide all requirements to enable compliance in advance of project.
- Notice of Completion: When all chaseways have been retrofitted, and inspected. Payment Schedules Per Agreement.

SCHEDULE / TASKS / TIME FRAMES:

1. SURVEY OF FACILITY / WORK SCHEDULE
   Review of existing plumbing and irrigation fixtures, prison layout for creation of work schedules. Survey will allow proper parts and hardware procurement for the most efficient installation and minimum inconvenience for prison staff.

   Time for Task: 20 days.

2. RETROFIT PROCESS- INSTALLATION
   Retrofit of existing plumbing valves, buttons, irrigation systems, mapping and related work etc. per work schedule.

   Time for Task: 7,500 estimated man-hours, depending on work done. Number of work days estimated with anticipated 8 man crew: 150-175 days.

3. SYSTEM SET-UP / TRAINING AND SUPPORT
   Walk-through of all installed systems. Adjustment of system parameters per prison staff. Classroom training of system operations, troubleshooting of all components parts, replacement techniques, and contact information for technical support. Supply of inventory for replacement situations.

   Time for Task: 10 days

PROJECT COSTS:

Location	Description	Quantity	Cost/Item	TOTAL COST
CIW	Water Closet Systems	920	$495	$455,400
	Shower Retrofit Pckg	72	$310	$22,320
YTS	Water Closet Systems	600	$495	$297,000
	Shower Retrofit Pckg w/showerhead	205	$325	$66,625
MSF	Water Closet Systems	675	$495	$334,125
	Shower Retrofit Pckg w/showerhead	108	$325	$35,100
RCC	Water Closet Systems	614	$495	$303,930
	Shower Retrofit Pckg	200	$310	$62,000
RCW	Water Closet Systems	80	$565	$45,200
	Shower Retrofit Pckg w/showerhead	200	$355	$71,000
RCE	Water Closet Systems	670	$495	$331,650
	Shower Retrofit Pckg w/showerhead	72	$325	$23,400
ALL	Irrigation Costs			$292,250
ALL	**TOTAL**			**$2,340,000**

Quarterly Project Schedule					
Task Description	Schedule (days)	Cumulative (days)	QTR Breaks	Costs	Costs /Qtr
Survey of Facilities	2	2	2	2,000	
Develop Work Plan	18	18	18	8,000	
Installation	175	195	70	928,000	1st 938,000
			90	1,193,143	2nd 1,193,143
			15	198,857	
System Start-up	10	205	10	10,000	3rd 208,857
Total:				$2,340,000	$2,340,000

A-7 Monitoring and Evaluations

A study similar to the one completed for the Wasco State Prison will be completed for this program. Using the existing meters at CIM, we will document water consumption following the plumbing retrofits and irrigation 'smart' program implementation. These numbers will be compared to the baseline numbers already obtained from the CIM in order to document water savings and program success. Additionally, we will conduct an annual follow-up review of the program to determine if the maintenance and water reduction goals and objectives outlined in this proposal have been met.

Specifically, we will supply a report indicating the following:

1. Reduced gallons/ acre-feet per site per meter;
2. Weather adjustments per MWD outlines;
3. Overall system operation and other benefits per site staff and comments.

A-8 Qualifications of Applicant and Cooperators

Inland Empire Utilities Agency, is a wholesale water district that distributes imported water, provides industrial/municipal wastewater collection and treatment services, recycled water, and other services to the cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Rancho Cucamonga, and Upland. The agency serves a population of 700,000 in a 242-square mile service area of southwest San Bernardino County.

Inland Empire Utilities Agency is a full signatory member of the California Urban Water Conservation Council (CUWCC) Memorandum of Understanding (MOU) regarding urban water best management practices (BMP). Inland Empire Utilities Agency is committed to implementing the fourteen BMP's identified in the MOU. In addition, Inland Empire Utilities Agency completed and submitted an Urban Water Management Plan (UWMP) to the California Department of Water Resources in December 2000. The UWMP sets a short-term conservation goal of 5,000 AFY by the year 2005 and a long-term conservation goal of 25,000 AFY by the year 2020. This completion of this project will help meet both the long-term and short-term goals in the UWMP. Attachment 1 is a resume of the project manager for IEUA.

Chino Basin Watermaster, is the entity charged with administering adjudicated water rights and managing groundwater resources within the watershed and groundwater basin known as the Chino Groundwater Basin. The mission of the Watermaster is "to manage the Chino Groundwater Basin in the most beneficial manner and to equitably administer and enforce the provisions of the Chino Basin Judgment." As the authority over the groundwater basin, the Chino Basin Watermaster also maintains strict accounting of those agencies/organizations that pump groundwater. This includes the California State Prison facilities in Chino.

Icon Systems, Inc., manufacturer of the plumbing control technologies, is a 10 year old company located in Oviedo, Florida. Icon engineering staff has dozens of years in the design, development and manufacture of intelligent controls for the correctional industry.

Icon has the largest installed base of correctional plumbing controls in the world. Since the early 1990's, tens of thousands of plumbing systems have been retrofitted with Icon flush, lavatory and shower systems. The success rate of these systems is reflected in the base of state and county agencies that extensively use the products. Currently, state correctional agencies in California, New York, Florida, Tennessee, as well as County agencies all over the country, are utilizing Icon products. Most critical to this proposal, the California Department of Corrections has extensively evaluated, and is now recommending Icon products to be utilized at any State facility that has the need and opportunity. A detailed report from the State is available upon request.

Bottom Line Utility Solutions, Inc. provides the field support and installation services for Icon on major state and county projects. Based in California, this 6-year-old company has provided large-scale plumbing retrofits for corrections, as well as for colleges, schools and the private sector. Bottom Line's expertise is to survey correctional sites, develop product needs, scope of work, and provide installation of the Icon systems in a turnkey manner. Bottom Line works closely with Icon in all facets to assure proper communications, meet all security issues, and get the project done in a timely and efficient manner.

United GreenTech is the local technical arm and distributor for various irrigation control systems. United Greentech has been involved in dozens of large-scale irrigation projects, from design to construction over the past 15 years. United Greentech will provide a "turnkey" approach to the implementation of the hardware side (irrigation time clocks, valves, wires, etc.) of the irrigation program.

Greenleaf Mapping will provide consulting, mapping and other support services to United Greentech as well as to prison maintenance staff. Greenleaf will map the sites for developing better irrigation schedules, but will also provide advice to maintenance staff on various methods to save water in the landscape. Greenleaf has 25 years in the industry providing these type of consulting services and has documented reductions in irrigation watering as much as 40% with its programs.

California Institution for Men (CIM) Staff will provide some of the work to support the installation of the plumbing controls, electrical work, plumbing work, etc. In addition, inmates will be utilized to provide much of the manual labor for trenching on the irrigation work. All site staff will be trained in operation and use of all provided hardware and programs.

A-9 Innovation

Toilets, showers and lavatories in correctional institutions are an aspect of inmate activities that are “uncontrolled” – the result is use and abuse of the fixtures, high water and sewer costs, and reduced security.

1. Excessive toilet use. Based on a recent study by the Marin County Water District at San Quentin State Prison, Ca., the average prison toilet is flushed 44 times per day, leading to an enormous use of water, and the associated water and sewer charges. Studies at Wasco indicate waste from toilet abuse is over 160 gallons per day per toilet.

2. Excessive use of plumbing fixtures leads to rapid “wear and tear” and increased maintenance costs –mostly in diaphragms, replacement parts and labor.

3. Inmate’s ability to abuse plumbing fixtures can lead to cell flooding, clogged pipes (from clothing, bedding, etc), and expensive, emergency repairs.

4. Inmate’s ability to abuse plumbing fixtures, as well as flush contraband, leads to reduced facility control and security, and potentially dangerous situations.

In response to these issues, plumbing control technologies, unique to the correctional industry, were developed. The basic premise being that in a prison or jail environment, even the plumbing must be controlled or abuse will result.

The ICON flush and shower valve systems include their own valve assemblies that replace existing high maintenance fixtures, which have the ability to be controlled by the ICON electronic control package. Once installed, the electronics will monitor valve usage, restricting the number of flushes. This ability to “lock out” excessive flushing or showering will almost eliminate the maintenance hours and security issues associated with parts replacement, clogged pipes, flooded cells, etc.

Most importantly, the ICON system will reduce water and sewer expenses for flush valves using two main methods. First, by eliminating excessive flushing, the number of flushes per day will be reduced by a certain factor (generally estimated to be a minimum of 50%). The ICON also reduces the gallons per flush from the present average 4.5 gallons to approximately 1.3. The ability to retrofit the existing high gallon fixtures with the Icon was verified by the State of California Department of Corrections at high flush volume installations in early spring 2002. Each time the toilet is flushed, it will use a prescribed reduction in water, and the corresponding reduction in water and sewer expense.

For the shower systems, water will be reduced in two main ways, depending upon the situation. First, low-flow showerheads will be provided where appropriate, reducing gallons per minute from higher gallon heads to lower gallon heads. Secondly, a time-control system on the showers so that inmates have a designated amount of time to shower, versus present conditions where inmates have the capability of lengthy showers. A designated length will reduce unnecessary showering.

The application of irrigation water at the CIM is being done using either automated irrigation or manually operated systems. In both cases, water is applied using only "guesswork" by either site staff or inmates. Without the hardware or proper information, irrigation over-watering is the result.

The use of irrigation automation approach to the manually operated systems will set the maximum levels of applied irrigation. Then, the use of the scientifically based watering schedule, which incorporates local evapo-transpiration data from the nearby California weather station in Pomona, Ca. will not only reduce irrigation water consumption, but will also result in more efficient watering. The use of this "smart" program will reduce over-watering and allow the CIM to irrigate and maintain the grounds using the least amount of water necessary to sustain plant life. Site staff will have the hardware as well as the data to irrigate properly.

A-10 Agency Authority

1. The applicant (Inland Empire Utilities Agency) has the legal authority to submit this application and to enter into a funding contract with the State. Provide documentation such as an agency board resolution or other evidence of authority.

   Attachment 2 is a draft board resolution that will be submitted to the IEUA Board of Directors for approval in January 2003.

2. What is the legal authority under which the applicant was formed and is authorized to operate?

   The IEUA was originally formed as the Chino Basin Municipal Water District (CBMWD) in 1950 under the "Municipal Water District Act of 1911." The CBMWD later changed its name to "Inland Empire Utilities Agency* (*A Municipal Water District)." Attachment 3 is a letter from IEUA's legal consultant with a legal opinion regarding IEUA's ability to enter into a financial agreement with a State agency. If a more specific letter is required, IEUA can provide it.

3. Will the funding agreement between the applicant and the State be subject to review and/or approval by other government agencies? If yes, identify all such agencies (e.g. Local Area Formation Commission, local governments, U.S. Forest Service, California Coastal Commission, California Department of Health Services, etc.).

   No.

4. Is there any pending litigation that may impact the financial condition of the applicant, the operation of the water facilities, or its ability to complete the proposed project? If none is pending, so state.

   There is no pending litigation.

A-11 Operations and Maintenance

Applicable for construction projects only.

Application Part B

Engineering and Hydrologic Feasibility

THIS SECTION ONLY REQUIRED FOR CONSTRUCTION PROJECTS

B-1 Certification Statement
B-2 Project Reports and Previous Studies
B-3 Preliminary Project Plans and Specifications
B-4 Construction Inspection Plan

Application Part C

Plan for Completion of Environmental Documentation and Permitting Requirements

C-1 California Environmental Quality Act and National Environmental Policy Act
C-2 Permits, Easements, Licenses, Acquisitions, and Certifications
C-3 Local Land Use Plans
C-4 Applicable Legal Requirements

The Water Conservation Program at the CIM does not constitute a "project" as defined by the California Environmental Quality Act (CEQA). There are no other permits or approvals required by State, Federal, and/or local agencies to conduct this water conservation program. The IEUA will provide all other documentation as required to successfully conduct this program.

In reference to sections "C-2, C-3, and C-4", since this is a water conservation program and not a construction program, the items listed in these sections are not required for the program to proceed.

Application Part D

Need for Project and Community Involvement

D-1 Need for the Project
D-2 Outreach, Community Involvement, Support, Opposition

D-1 Need for the Project

The CIM utilize their own well system that provides water to all of the facilities included in this program. A review of the current irrigation, showers, toilets and other usage, indicates an extremely high volume of water usage, which is approximately 2.2 million gallons per day.

SITE	TOTAL USAGE ACRE-FEET	DOMESTIC USAGE (TOILETS/SHOWERS)	MISC. 10% (OTHER USAGE)	EST. IRRIGATION
CIM/MSF	441	213	44	184
RCE	222	184	22	16
RCC	273	173	27	73
RCW	296	79	29	188
CIW	375	249	37	89
YTS	241	162	24	55
TOTAL	**1,847**	**1060**	**183**	**604**
OTHER	487.24			112
METERED				
UNMETERED	168.12			117

The proposed program provides a cost-effective solution to effectively reducing the amount of water consumption that is consistent with local and regional water management plans. In less than five years, the proposed program will result in a cost savings that essentially pays for the program.

Results from a similar program implemented at the Wasco State Prison in Wasco, California have been documented in a completed study recently produced that demonstrates their water closet water savings from implementation of the same plumbing retrofits recommended for this program. A summary detailing these results has been included in this proposal section E-1.

In addition, the well systems are becoming increasingly higher in nitrates and require more filtration and cost. Subsidence in and around the facility, due to extraction of the water, has caused many problems, and will continue to cause problems.

Although the reductions in water usage and accompanying costs are significant, the facility has aging, failure-prone plumbing, which leads to excessive maintenance and related costs. Replacements will aid the facility in reducing overall facility costs due to old equipment, and inmate abuse and water damage. Significant health issues facing the facility are avoided as well as sewer back-ups and exposure are greatly reduced with plumbing controls.

Security is perhaps the most important issue of State prison facilities. The Dept. of Corrections has determined that control of the plumbing systems will increase the security and safety of the facility for staff, visitors and inmates.

Finally, the California Department of Corrections has decided that plumbing controls are the solution for their facilities, and are now recommending the use of plumbing controls throughout the State. However, with the current State budget crisis, funds are not available to retrofit the facilities with the needed equipment. Therefore, retrofits can only be accomplished outside of the regular budgeting process.

D-2 Outreach, Community Involvement, Support, Opposition

For the plumbing control technologies recommended, the California Department of Corrections has done extensive analysis, and now is supporting state-wide use of plumbing controls as it positively impacts water usage, maintenance issues and security issues. The analysis is wrapped up in a Memorandum from the California Department of Corrections management staff, dated May 8, 2002, supporting the retrofit of all California State Prisons. The memorandum is Attachment 4.

IEUA has already approached the CIM management staff regarding this program. Attachment 5 is a letter from the Warden of CIM supporting the water conservation project.

Finally, Attachment 6 is a news article from The Orlando Sentinel from September 30, 1997 regarding the experiences of Florida Prison officials.

Application Part E

Water Use Efficiency Improvements and Other Benefits

E-1 Water Use Efficiency Improvements
E-2 Other Project Benefits

E-1 Water Use Efficiency Improvements

The CIM includes the following facilities (MSF, RCC, RCW and RCE). The CIW has only one main facility, designated as CIW. The YTS has one facility, designated as YTS. Each of the sites has a designated number of plumbing systems (toilets, showers, etc.), which have been inventoried and utilized for this analysis of water usage and potential savings. In addition, calculations have been made for the amount of water usage for the many acres of irrigated landscape at the facilities as well, to estimate potential savings as well. Counts of existing irrigation systems have been collected as well. Staff has supplied water consumption histories from each site, which provides total usage for all water use. Through calculations, estimates, etc., plumbing usage, irrigation usage, etc. has been calculated so as to verify all figures and savings.

For the plumbing control technologies recommended, the California Department of Corrections has done extensive analysis, and now is supporting state-wide use of plumbing controls as it positively impacts water usage, maintenance issues and security issues.

We believe that results similar to those achieved at the Wasco State Prison will be seen following implementation of this program. Recent studies at Wasco State prison have demonstrated that the average correctional toilet after the Icon retrofit, reduced consumption by 166 gallons per day per toilet. The following is a section from the "State of California, Wasco State Prison, Budget Change Proposal, Electronic Plumbing Control Retrofits" report. The full report is 15 pages with 10 addendum's and covers all the benefits of plumbing controls (water and sewer savings, maintenance savings, parts savings, health and safety issues, security issues, etc.). The following section details the water usage both before and after plumbing retrofits in a California State Prison environment.

"Installation of electronic plumbing control systems on the toilets and showers will mitigate the following issues at WSP/RC:

> **Production Costs: The WSP/RC has installed 90 electronic plumbing control systems on the toilets only in one of the controlled housing units. A water meter was installed to measure the water consumption that feeds this one housing unit approximately 2 months prior to the plumbing control installations. Daily readings of water usage were recorded.**
>
> **The average daily usage for 190 inmates had been approximately 32,150 gallons per day prior to the plumbing control installation. After nearly all of the water closets had been retrofitted with plumbing controls, the daily water consumption has averaged approximately 15,500 gallons. This shows a per day reduction in water consumption of 16,650 gallons per day, or 53% savings, as result of the electronic plumbing controls. The daily savings per inmate have been 83 gallons per day, and the savings per water closet retrofit have been 166 gallons per day (two inmates per water closet).**

When all 1,900 toilets are retrofitted, the Institution anticipates a reduction of 315,400 gallons per day, and a yearly water reduction of 115,121,000 gallons of water processed per year, a cost avoidance of $97,852 per year, at $ .85/1000 gallons, for conversion of the toilets alone.

The 225 shower valves are used by 6,100 inmates, resulting in very high volumes of water usage per fixture. Current shower usage can be estimated using the fact that each inmate showers once per day, meaning 6,100 showers, running for 10 minutes each, at 3 gallons per minute would yield daily usage of 183,000 gallons, or yearly usage of 66,795,000 gallons.

Retrofit of the shower valves will result in time control showers, usually set at 5 minutes per shower, adjustable by staff if desired. Secondly, retrofit of showerheads will be to 1.5 gallons per minute correctional style heads. Daily estimated usage after plumbing retrofit would be as follows; 6100 showers, running for 5 minutes, at 1.5 gallons would yield 45,750 gallons or yearly usage of 16,698,750 gallons.

Yearly Production Cost Avoidance from Shower Retrofits: 50,096,250 gallons and a cost avoidance of $ 42,581 per year."

Water usage in the water closets estimated using gallons per flush of existing fixtures, which are 4.0-5.0 gallons approximately per flush. An average of 4.5 gallons was used for this analysis. Usage per day further calculated by number of flushes each day per toilet, from review of site water usage data and staff observations. Industry average is 44 flushes per toilet per day per study done by the Marin County Water Authority at San Quentin.

Following Icon retrofit, consumption will be reduced in two ways. First, the gallons per flush will be at 1.3 gallons per product design and specification. Secondly, the "lock-out" feature of the Icon product will reduce the abuse of toilets by a minimum 50% reduction in the number of flushes (from 44 per day to 22 per day).

Using these assumptions, the estimated savings are almost identical to the documented savings achieved at Wasco following their retrofits. This confirms that the assumptions are reasonable and accurate, and that the total savings estimates for the project are as well.

For showers, CIM staff has provided length of time of showers as well gallons per minute and usage patterns of inmate showering. Shower length varied by site, as did shower head gallons per minute. But the inputs from CIM staff are reflected in each spreadsheet for each site. Using these inputs, and installing Icon time controlled shower systems, and lower volume showerheads where appropriate, yielded the savings figures from shower retrofits.

Irrigation improvements using the automated irrigation system, weather-based scheduling and expertise in landscaping are expected to reduce water consumption by a minimum of 30%. Numerous past programs using automation and weather-based irrigation scheduling have saved from 30% to 50%. With 834 acre-feet of water currently being used to irrigate all six facilities each year the proposed program will result in a significant reduction in water consumption.

E-2 Other Project Benefits

Added program benefits as stated earlier in this proposal include the reduced maintenance time spent on sewer issues that result from misuse of shower and flush valves, as well as increased security that occurs because inmates will not be required to be removed from cells as often due to sewer issues. Additionally, large reductions in parts costs and associated labor, as well as reduced plumbing calls for sewer clogs, will be achieved at the facility.

Saving water related to irrigation is also a benefit. Saving money and a limited resource are the top priorities of this proposed program.

Application Part F

Economic Justification: Benefits to Costs

F-1 Net Water Savings
F-2 Project Budget and Budget Justification
F-3 Economic Efficiency

F-1 Net Water Savings

The proposed program will produce water savings by retrofitting the existing flush and shower valves with water efficient products. The following are tables indicating the water and cost savings associated with this program. A table for each facility has been created that illustrates the amount of water utilized prior to and anticipated savings after retrofit are complete. The figure of $467 per acre-foot is from an analysis produced by the CIM staff estimating the cost of water after the new wells, booster pumps, and denitrification facilities are brought on-line. Attachment 7 provides this analysis.

Table A. IRRIGATION WATER SAVINGS FROM RETROFITS-ALL FACILITIES

SITE	EXISTING AF USAGE	SAVINGS 30%	SAVINGS $ 467/AF
CIM/MSF	184	55.2	$25,778.40
RCE	16	4.8	$2,241.60
RCC	73	21.9	$10,227.30
RCW	188	56.4	$26,338.80
CIW	89	26.7	$12,468.90
YTS	55	N/A	
OTHER METERED	112	33.6	$15,691.20
WELL METER	117	35.1	$16,391.70
TOTAL	**834**	**233.7**	**$109,137.90**

Table B. YTS FACILITY -PLUMBING:

ASSUMPTIONS AND BACK-UP DATA FOR COST/SAVINGS OF ICON RETROFITS

COST OF WATER PER ACRE-FOOT	$467		
		ICON FLUSH VOLUME	1.3
NUMBER OF WATER CLOSETS	600	ICON FLUSH PER DAY PER TOILET	22
NUMBER OF SHOWERS	205	ICON SHOWER GALLONS PER MINUTE: GPM	1.5
FLUSH VOLUME PER TOILET – GALLONS	4.5	ICON SHOWER LENGTH PER INMATE: MINUTES	4
NUMBER OF FLUSHES PER DAY PER TOILET	44		
SHOWER GALLONS PER MINUTE: GPM	5		
SHOWER LENGTH PER INMATE:MINUTES	5		
AVERAGE NUMBER OF INMATES:	1000		

ANNUAL SAVINGS CALCULATIONS BASED ON ASSUMPTIONS:

WATER CLOSET SAVINGS:

FLUSH BEFORE	FLUSH AFTER	ACRE-FEET BEFORE	ACRE-FEET AFTER	ACRE-FEET SAVINGS	DOLLAR SAVINGS
4.5	1.3	133.42	19.27	114.15	$53,308

SHOWER SAVINGS:

GPM BEFORE	GPM AFTER	ACRE-FEET BEFORE	ACRE-FEET AFTER	ACRE-FEET SAVINGS	DOLLAR SAVINGS
5	1.5	28.08	6.74	21.34	$ 9,965
			TOTAL SAVINGS FROM PROGRAM:		**$**

63,273

Table C. RCW FACILITY - PLUMBING:

ASSUMPTIONS AND BACK-UP DATA FOR COST/SAVINGS OF ICON RETROFITS

COST OF WATER PER ACRE-FOOT	467		
		ICON FLUSH VOLUME	1.3
NUMBER OF WATER CLOSETS	80	ICON FLUSH PER DAY PER TOILET	90
NUMBER OF SHOWERS	200	ICON SHOWER GALLONS PER MINUTE: GPM	1.5
FLUSH VOLUME PER TOILET – GALLONS	4.5	ICON SHOWER LENGTH PER INMATE: MINUTES	5
NUMBER OF FLUSHES PER DAY PER TOILET	120		
SHOWER GALLONS PER MINUTE: GPM	3.5		
SHOWER LENGTH PER INMATE:MINUTES	6		
AVERAGE NUMBER OF INMATES:	1600		

ANNUAL SAVINGS CALCULATIONS BASED ON ASSUMPTIONS:

WATER CLOSET SAVINGS:

FLUSH BEFORE	FLUSH AFTER	ACRE-FEET BEFORE	ACRE-FEET AFTER	ACRE-FEET SAVINGS	DOLLAR SAVINGS
4.5	1.3	48.52	10.51	38.00	$17,748

SHOWER SAVINGS:

GPM BEFORE	GPM AFTER	ACRE-FEET BEFORE	ACRE-FEET AFTER	ACRE-FEET SAVINGS	DOLLAR SAVINGS
3.5	1.5	37.74	13.48	24.26	$ 11,329
			TOTAL SAVINGS FROM PROGRAM:		**$ 29,077**

Table D. RCE FACILITY - PLUMBING:

ASSUMPTIONS AND BACK-UP DATA FOR COST/SAVINGS OF ICON RETROFITS

COST OF WATER PER ACRE-FOOT	$467		
WATER USAGE – RCW			
		ICON FLUSH VOLUME	1.3
NUMBER OF WATER CLOSETS	670	ICON FLUSH PER DAY PER TOILET	22
NUMBER OF SHOWERS	72	ICON SHOWER GALLONS PER MINUTE: GPM	1.5
FLUSH VOLUME PER TOILET – GALLONS	4.5	ICON SHOWER LENGTH PER INMATE: MINUTES	5
NUMBER OF FLUSHES PER DAY PER TOILET	44		
SHOWER GALLONS PER MINUTE: GPM	2.5		
SHOWER LENGTH PER INMATE:MINUTES	10		
AVERAGE NUMBER OF INMATES:	1250		

ANNUAL SAVINGS CALCULATIONS BASED ON ASSUMPTIONS:

WATER CLOSET SAVINGS:

FLUSH BEFORE	FLUSH AFTER	ACRE-FEET BEFORE	ACRE-FEET AFTER	ACRE-FEET SAVINGS	DOLLAR SAVINGS
4.5	1.3	148.99	21.52	127.47	$59,527

SHOWER SAVINGS:

GPM BEFORE	GPM AFTER	ACRE-FEET BEFORE	ACRE-FEET AFTER	ACRE-FEET SAVINGS	DOLLAR SAVINGS
2.5	1.5	35.10	10.53	24.57	$ 11,473
			TOTAL SAVINGS FROM PROGRAM:		**$**

71,000

Table E. RCC FACILITY - PLUMBING:

ASSUMPTIONS AND BACK-UP DATA FOR COST/SAVINGS OF ICON RETROFITS

COST OF WATER PER ACRE-FOOT	$467		
WATER USAGE – RCW			
		ICON FLUSH VOLUME	1.3
NUMBER OF WATER CLOSETS	614	ICON FLUSH PER DAY PER TOILET	22
NUMBER OF SHOWERS	200		
FLUSH VOLUME PER TOILET – GALLONS	4.5	ICON SHOWER LENGTH PER INMATE: MINUTES	5
NUMBER OF FLUSHES PER DAY PER TOILET	44		
SHOWER GALLONS PER MINUTE: GPM	1.5		
SHOWER LENGTH PER INMATE:MINUTES	15		
AVERAGE NUMBER OF INMATES:	1440		

ANNUAL SAVINGS CALCULATIONS BASED ON ASSUMPTIONS:

WATER CLOSET SAVINGS:

FLUSH BEFORE	FLUSH AFTER	ACRE-FEET BEFORE	ACRE-FEET AFTER	ACRE-FEET SAVINGS	DOLLAR SAVINGS
4.5	1.3	136.53	19.72	116.81	$54,552

SHOWER SAVINGS:

GPM BEFORE	GPM AFTER	ACRE-FEET BEFORE	ACRE-FEET AFTER	ACRE-FEET SAVINGS	DOLLAR SAVINGS
1.5	1.5	36.39	12.13	24.26	$ 11,329
	TOTAL SAVINGS FROM PROGRAM:				**$ 65,880**

Table F. CIM/MSF FACILITY - PLUMBING:

ASSUMPTIONS AND BACK-UP DATA FOR COST/SAVINGS OF ICON RETROFITS

COST OF WATER PER ACRE-FOOT	$467		
		ICON FLUSH VOLUME	1.3
NUMBER OF WATER CLOSETS	675	ICON FLUSH PER DAY PER TOILET	22
NUMBER OF SHOWERS	108	ICON SHOWER GALLONS PER MINUTE: GPM	1.5
FLUSH VOLUME PER TOILET – GALLONS	4.5	ICON SHOWER LENGTH PER INMATE: MINUTES	5
NUMBER OF FLUSHES PER DAY PER TOILET	44		
SHOWER GALLONS PER MINUTE: GPM	2.5		
SHOWER LENGTH PER INMATE:MINUTES	10		
AVERAGE NUMBER OF INMATES:	2240		

ANNUAL SAVINGS CALCULATIONS BASED ON ASSUMPTIONS:

WATER CLOSET SAVINGS:

FLUSH BEFORE	FLUSH AFTER	ACRE-FEET BEFORE	ACRE-FEET AFTER	ACRE-FEET SAVINGS	DOLLAR SAVINGS
4.5	1.3	150.10	21.68	128.42	$59,971

SHOWER SAVINGS:

GPM BEFORE	GPM AFTER	ACRE-FEET BEFORE	ACRE-FEET AFTER	ACRE-FEET SAVINGS	DOLLAR SAVINGS
2.5	1.5	62.89	18.87	44.02	$ 20,559

TOTAL SAVINGS FROM PROGRAM:	$ 80,531

Table G. CIW FACILITY - PLUMBING:

ASSUMPTIONS AND BACK-UP DATA FOR COST/SAVINGS OF ICON RETROFITS

COST OF WATER PER ACRE-FOOT	$467		
		ICON FLUSH VOLUME	1.3
NUMBER OF WATER CLOSETS	920	ICON FLUSH PER DAY PER TOILET	25
NUMBER OF SHOWERS	72		
AVERAGE FLUSH VOLUME PER TOILET	4.5	ICON SHOWER LENGTH PER INMATE: MINUTES	7
NUMBER OF FLUSHES PER DAY PER TOILET	50		
SHOWER GALLONS PER MINUTE: GPM	1.5		
SHOWER LENGTH PER INMATE:MINUTES	15		
AVERAGE NUMBER OF INMATES:	1700		

ANNUAL SAVINGS CALCULATIONS BASED ON ASSUMPTIONS:

WATER CLOSET SAVINGS:

FLUSH BEFORE	FLUSH AFTER	ACRE-FEET BEFORE	ACRE-FEET AFTER	ACRE-FEET SAVINGS	DOLLAR SAVINGS
4.5	1.3	231.87	33.49	198.38	$92,642

SHOWER SAVINGS:

GPM BEFORE	GPM AFTER	ACRE-FEET BEFORE	ACRE-FEET AFTER	ACRE-FEET SAVINGS	DOLLAR SAVINGS
1.5	1.5	42.85	19.99	22.85	$ 10,671
		TOTAL SAVINGS FROM PROGRAM:			**$ 103,314**

F-2 Project Budget and Budget Justification

Location	Description	Quantity	Cost/Item	Total Cost
CIW	Water Closet Systems	920	$495	$455,400
	Shower Retrofit Pckg	72	$310	$22,320
YTS	Water Closet Systems	600	$495	$297,000
	Shower Retrofit Pckg w/showerhead	205	$325	$66,625
MSF	Water Closet Systems	675	$495	$334,125
	Shower Retrofit Pckg w/showerhead	108	$325	$35,100
RCC	Water Closet Systems	614	$495	$303,930
	Shower Retrofit Pckg	200	$310	$62,000
RCW	Water Closet Systems	80	$565	$45,200
	Shower Retrofit Pckg w/showerhead	200	$355	$71,000
RCE	Water Closet Systems	670	$495	$331,650
	Shower Retrofit Pckg w/showerhead	72	$325	$23,400
ALL	Irrigation costs			$292,250
	Legal & License fees			$ 0
	Consultant fees			$ 0
			TOTAL	**$2,340,000**

F-3 Economic Efficiency

The proposed program results in a 100% payback in an average of 4.5 years. The following is a list of each facility with anticipated payback time: YTS – 5.75 years; RCW – 4.00 years; RCE – 5.00 years; RCC – 5.55 years; MSF – 4.58 years; and CIW – 4.62 years.

The savings and paybacks offered above are for water savings only. Each facility will also achieve parts and labor savings that are quite significant. Based on the studies done at Wasco State Prison, there would be additional savings from plumbing retrofits;

1. Labor Hours saved @ 3,000 Hrs.
   @ $ 30.00/hour: $ 90,000

2. Parts Savings: $ 42,000

3. Misc Savings Per Wasco report: $ 75,000

Appendix – Benefit/Cost Analysis Tables

Table 1: Capital Costs

Table 2: Annual Operations and Maintenance Costs

Table 3: Total Annual Costs

Table 4a: Water Supply Benefits: Avoided Cost of Current Supply Sources
Table 4b: Water Supply Benefits: Alternative Cost of Future Supply Sources
Table 4c: Water Supply Benefits: Water Supplier Revenue (Vendibility)
Table 4d: Total Water Supply Benefits

Table 5: Benefit/Cost Ratio

Table 6: Capital Recovery Factor

If Operation and Maintenance Costs or Benefits vary significantly over time, use the "Long Form" Tables provided on the website at: www.water.ca.gov.

Please contact Lorraine Marsh, DWR Economist at (916) 653-6414 or lmarsh@water.ca.gov if you need assistance or have any questions about the tables.

Table 1: Capital Costs

	Capital Cost Category *(a)*	Cost *(b)*	Contingency Percent *(c)*	Contingency $ *(d)*	Subtotal *(e)*
				(bxc)	*(b+d)*
(a)	Land Purchase/Easement				$0
(b)	Planning/Design/Engineering				$0
(c)	Materials/Installation	$2,340,000			$2,340,000
(d)	Structures				$0
(e)	Equipment Purchases/Rentals				$0
(f)	Environmental Mitigation/Enhancement				$0
(g)	Construction/Administration/Overhead				$0
(h)	Project Legal/License Fees				$0
(i)	Other				$0
(j)	Total **(1)** (a + ... + i)				$2,340,000
(k)	Capital Recovery Factor: use Table 6				.1030
(l)	Annual Capital Costs (j x k)				$241,000

(1) Costs must match Project Budget prepared in Section F-2.

Table 2: Annual Operations and Maintenance Costs

Administration *(a)*	Operations *(b)*	Maintenance *(c)*	Other *(d)*	Total *(e)*
				$0

Table 3: Total Annual Costs

Annual Capital Costs (1) *(a)*	Annual O&M Costs (2) *(b)*	Total Annual Costs © *(a+b)*

$241,000	$0	$241,000

(1) From Table 1 line (l)
(2*)* From Table 2 Total, column *(e)*

Table 4: Water Supply Benefits

Net water savings (acre-feet/year) 1118.23 AF

4a. Avoided Costs of Current Supply Sources

Sources of Supply *(a)*	Cost of Water ($/AF) *(b)*	Annual Displaced Supply (AF) *(c)*	Annual Avoided Costs ($) *(d)* *(b x c)*
Treated Groundwater	**$467.06**	**1,118.23**	**$522,280.50**
Total			

4b. Alternative Costs of Future Supply Sources

Future Supply Sources *(a)*	Total Capital Costs ($) *(b)*	Capital Recovery Factor (1) *(c)*	Annual Capital Costs ($) *(d)* *(b x c)*	Annual O&M Costs ($) *(e)*	Total Annual Avoided Costs ($) *(f)* *(d + e)*
No alternative projects					
Total					

(1) 6% discount rate; Use Table 6- Capital Recovery Factor

4c. Water Supplier Revenue (Vendibility)

Parties Purchasing Project Supplies *(a)*	Amount of Water to be Sold *(b)*	Selling Price ($/AF) *(c)*	Expected Frequency of Sales (%) (1) *(d)*	Expected Selling Price ($/AF) *(e)* *(c x d)*	"Option" Fee ($/AF) (2) *(f)*	Total Selling Price ($/AF) *(g)* *(e + f)*	Annu Expect Wate Sale Reven ($) *(h)* *(b x g*
Total							

(1) During the analysis period, what percentage of years are water sales expected to occur? For example, if water will only be sold half of the years, enter 50% (0.5).

(2) "Option" fees are paid by a contracting agency to a selling agency to maintain the right of the contracting agency to buy water whenever needed. Although the water may not be purchased every year, the fee is usually paid every year.

4d: Total Water Supply Benefits

(a) Annual Avoided Cost of Current Supply Sources ($) from 4a, column (*d*)	$522,280.50
(b) Annual Avoided Cost of Alternative Future Supply Sources ($) from 4b, column (*f*)	n/a
(c) Annual Expected Water Sale Revenue ($) from 4c, column (*h*)	n/a

(d) Total Net Annual Water Supply Benefits ($) (a + b + c)	$522,280.50

Table 5: Benefit/Cost Ratio

Project Benefits ($) (1)	**$522,280.50**
Project Costs ($) (2)	**$241,000**
Benefit/Cost Ratio	**2.17**

(1) From Tables 4d, row (d): Total Annual Water Supply Benefits
(2) From Table 3, column (*c)* : Total Annual Costs

Table 6: Capital Recovery Factor

(Use to obtain factor for Table 1, Line k or Table 4b, Column *(c)*

Life of Project (in years)	Capital Recovery Factor
7	0.1791
8	0.1610
9	0.1470
10	0.1359
11	0.1268
12	0.1193
13	0.1130
14	0.1076
15	0.1030
16	0.0990
17	0.0954
18	0.0924
19	0.0896
20	0.0872
21	0.0850
22	0.0830
23	0.0813
24	0.0797
25	0.0782
26	0.0769
27	0.0757
28	0.0746
29	0.0736
30	0.0726
31	0.0718
32	0.0710
33	0.0703
34	0.0696
35	0.0690
36	0.0684
37	0.0679
38	0.0674
39	0.0669
40	0.0665
41	0.0661
42	0.0657
43	0.0653
44	0.0650
45	0.0647
46	0.0644

47	0.0641
48	0.0639
49	0.0637
50	0.0634